INTEX-NA Flight 12: July 25, 2004

This was the fourth DC-8 science flight from Pease AFB New Hampshire. Objectives for this flight included validation of Terra and Aqua satellites, convective outflow from southeast US, mapping fresh emissions over several selected eastern locations, and an over-fly of the Huntsville lidar site as well as an Aeronet site. Total flight duration was 9.2 hours with a 9:00 am takeoff. Basic flight patterns and their location are shown in the slides below. The northernmost leg was substantially altered due to a developing storm and high level of cloudiness.

The frontal system that passed through Pease early Saturday morning had moved off the East Coast, several hundred miles east of New Hampshire. The front then extended southwestward, intersecting the coast over North Carolina. The DC-8 intersected this front during its low level run near 1340UT. Winds shifted from offshore to onshore during the traverse. Surface high pressure ridged from Iowa to a weaker lobe over New Hampshire. The flow in the middle and upper troposphere had changed considerably since the previous flight. Specifically, the East Coast trough had weakened dramatically, while a short wave trough was advancing eastward over the Midwest. The strong ridging over the West Coast also had diminished somewhat. As a result of these changes, the flow over the southern most part of the flight was rather disorganized. However, north of about 35 N, the flow was mostly from the southwest in advance of the Midwest trough. Clouds and deep convection were widespread over the area. Northern parts of the flight did not contain thunderstorms, but were blanketed in multi-layered clouds. Farther south, thunderstorms were only scattered over Florida, but increased dramatically in coverage as the flight headed toward northern Alabama and then turned eastward over Tennessee. These storms forced some changes to the original flight track.

Heading south over the Atlantic we encountered moderate pollution at 20000 ft (O3: 75-80 ppb; CO: 125 ppb). During descent to 1000 ft we crossed a front and encountered extremely clean air with near background composition (O3: 25 ppb; CO:80 ppb; SO4: 0.5 g/m3). Ascent to 33000 ft over the Atlantic showed signatures of deep convection between 20-33000 ft (at 33000 ft: O3:80-110 ppb; H2O2: 100 ppt) and substantial lightning influences (NO: 1 ppb). There were isolated thin (and dry) layers of pollution (CO>200 ppb) below 20000 ft during much of this flight. DC-8 did a spiral from 35-1000 ft under the Terra satellite at 16:25 UT under relatively cloud free conditions (10-15% cloud cover). This flight was focused on source characterization because of favorable meteorology for capturing fresh emissions. Surface (1000 ft) descent over southeast US showed the expected signatures of surface sources (SO4: 10 g/m3; HNO3: 1ppb; HCHO: 5 ppb) but also indicated small elevations in HCN suggesting biomass combustion influences. The western most point of the track was moved eastwards to make a under-fly of Aqua possible at the overpass time (1930 UT). We flew over the Huntsville lidar site at 25000 ft and climbed to 33000 ft in preparation for the Aqua spiral. Once again strong signatures of lightning (NO: 800 ppt) were evident. The spiral under Aqua was aborted due to extreme cloudiness. We used the remaining time to characterize surface sources and vertical structure over the northerly leg.

The navigational data are available at URL: http://www.dfrc.nasa.gov/Research/AirSci/DC-8/ICATS/index.html

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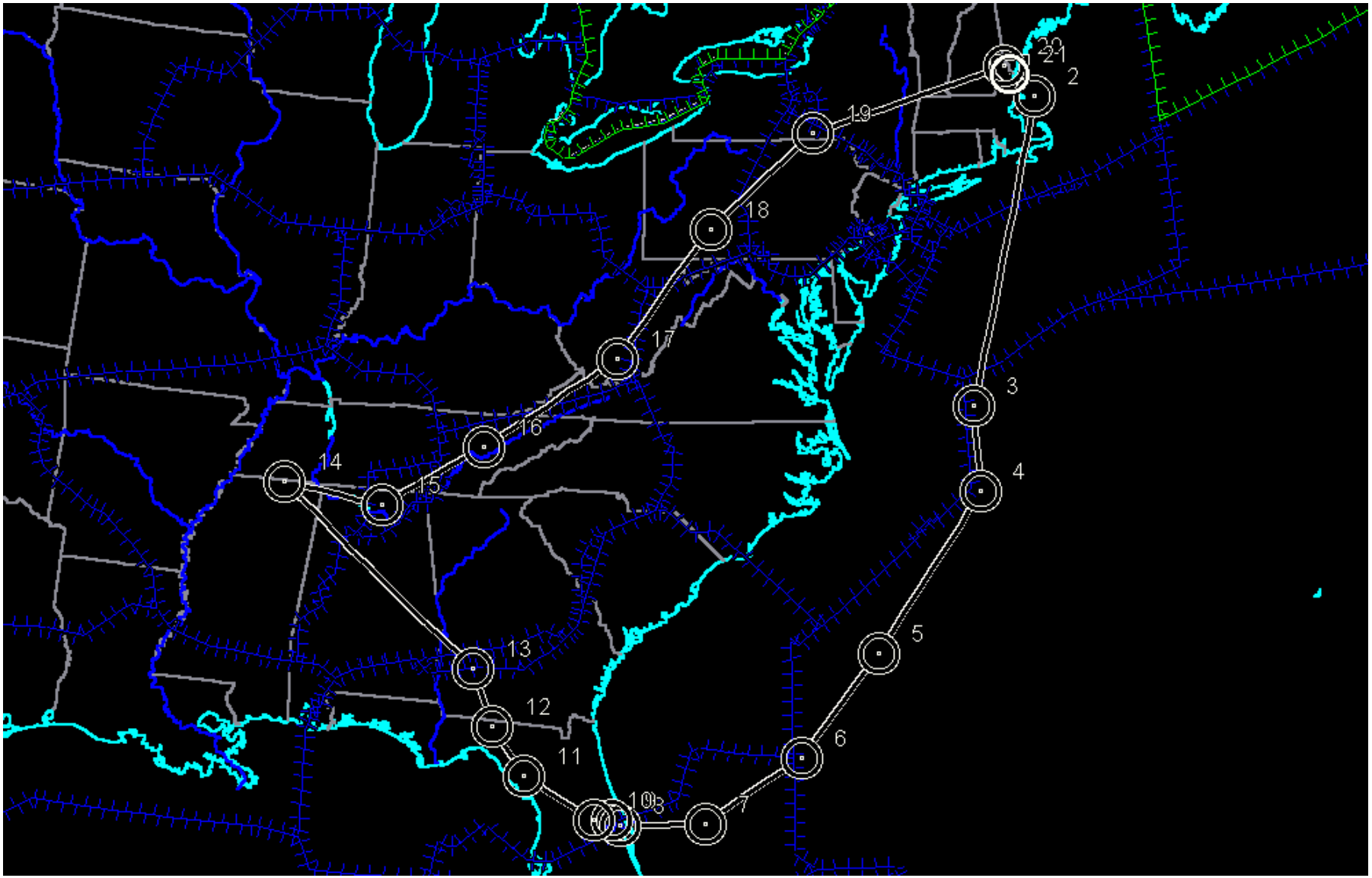

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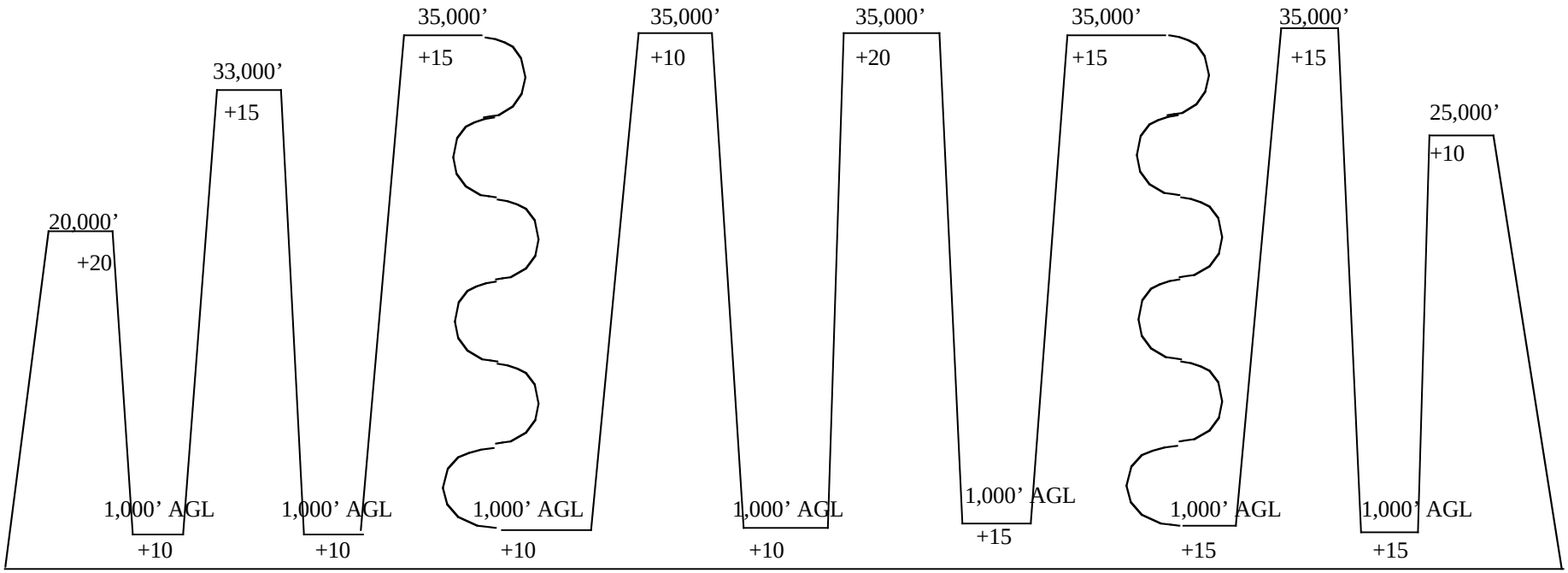
SPIRAL CLIMBS

to 10,000 msl @1,000 fpm

then 1500 fpm

ALL ENROUTE CLIMBS/DESCENTS

1500 FPM



PSM PT5 PT7 CTY PT14 PT15 PT16 BKW PSM

TYPE ACFT	CALL SIGN	DATE	FROM	TO	PLND TO	ACT TO	PILOT	COPILOT
DC-8	NASA817		PEASE INTL TR N 43 05.5 W070 50.0	PEASE INTL TR N 43 04.7 W070 49.4	13:00			

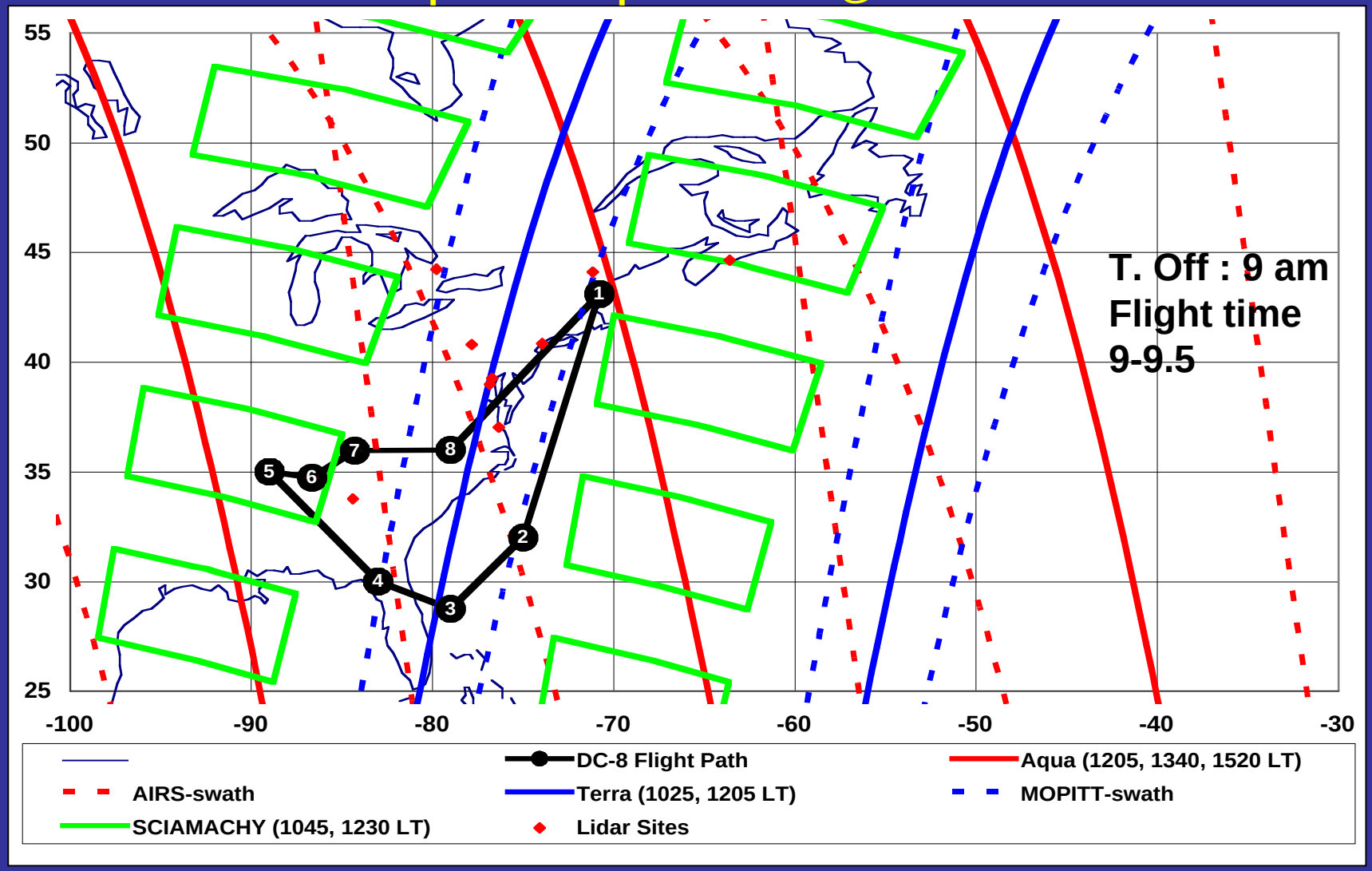
TOT DIST	TOT TIME	FUEL REQ	NAVIGATOR	ENGINEER
2739.6	09+26	98002		

TP DTD#	Fix/Point Description	FREQ	Latitude Longitude	Alt Wind	TAS GS	TC MC	LEG DIST DIST REM	LEG TIME TIME REM	ETA	RETA	ATA	REMARKS
1	KPSM 16/RW PEASE INTL TR		N 43 05.5 W070 50.0	94M		149 165	0.0 2740	00+00 09+26	13:00			
2	SCUPP/W SCUPP		N 42 36.2 W070 13.8	14485M	N/A N/A	138 154	39.6 2700	00+07 09+19	13:07			
3	COWRI/W COWRI		N 36 42.1 W072 27.1	20000M	330 330	196 211	368.4 2332	01+07 08+12	14:14			
4	PAEPR/W PAEPR		N 35 02.5 W072 25.0	20000M	330 330	179 192	99.5 2232	00+18 07+54	14:32			
5	.PT05 ILM/R141202	117X 117.00	N 32 00.0 W075 00.0	20000M	330 330	215 227	223.5 2009	00+41 07+13	15:13			
6	.PT06 OMN/R078228	073X 112.60	N 30 00.0 W076 50.0	20000M	330 330	218 228	152.5 1856	00+28 06+46	15:41			
7	.PT07 ORL/R084124	059X 112.20	N 28 45.0 W079 00.0	20000M	330 330	237 244	136.0 1720	00+25 06+21	16:05			
	.delay	059X 112.20	N 28 45.0 W079 00.0	20000M	330 330	237 244	0.0 1720	00+35 05+46	16:40			
8	MALET/W MALET		N 28 41.6 W080 51.9	20000M	330 330	268 274	98.4 1622	00+18 05+28	16:58			
9	COZMO/W COZMO		N 28 47.9 W081 04.4	20000M	330 330	300 306	12.7 1609	00+02 05+26	17:01			
10	UGMAH/W UGMAH		N 28 46.9 W081 26.7	20000M	330 330	267 272	19.7 1589	00+04 05+22	17:04			
11	CTY/R CROSS CITY	057X 112.00	N 29 35.9 W083 02.9	20000M	330 330	300 305	97.4 1492	00+18 05+04	17:22			
12	GEF/R GREENVILLE	027X 109.00	N 30 33.1 W083 47.0	20000M	330 330	326 330	68.6 1423	00+12 04+52	17:34			
13	PZD/R PECAN	108X 116.10	N 31 39.3 W084 17.6	20000M	330 330	338 342	71.1 1352	00+13 04+39	17:47			

TP	Fix/Point	FREQ	Latitude	Alt	TAS	TC	LEG DIST	LEG TIME	ETA	RETA	ATA	REMARKS

DTD#	Description		Longitude	Wind	GS	MC	DIST REM	TIME REM				
14	.PT14 HLI/R057028	071X 112.40	N 35 00.0 W089 00.0	20000M	330 330	310 313	310.0 1042	00+56 03+43	18:44			
15	.PT15 RQZ/R185004	059X 112.20	N 34 43.5 W086 38.7	20000M	330 330	098 100	117.4 925	00+21 03+21	19:05			
16	.PT16 VXV/R283020	111X 116.40	N 35 57.6 W084 17.4	20000M	330 330	057 061	137.2 788	00+25 02+56	19:30			
	.delay	111X 116.40	N 35 57.6 W084 17.4	20000M	330 330	057 062	0.0 788	00+35 02+21	20:05			
17	BKW/R BECKLEY	124X 117.70	N 37 46.8 W081 07.4	20000M	330 330	054 060	187.4 600	00+34 01+47	20:39			
18	JST/R JOHNSTOWN	077X 113.00	N 40 19.0 W078 50.0	20000M	330 330	035 044	185.9 414	00+34 01+13	21:13			
19	CFB/R BINGHAMTON	059X 112.20	N 42 09.4 W076 08.2	20000M	330 330	048 059	164.6 250	00+30 +43	21:43			
20	EPDEY/W EPDEY		N 43 14.5 W070 57.5	20000M	330 330	074 089	238.1 11	00+43 +00	22:26			
21	KPSM/A PEASE INTL TR		N 43 04.7 W070 49.4	100M		149 165	11.5 0	00+00 +00	22:26			

INTEX Flight #12 Plan – Pease Local #4 on 7/25
plan last updated 7/23 @15Z



Objectives: 1- Convective outflow from southeast U.S. (points 2-4)
2-Map Ohio River Valley emissions in northerly flow (points 5-8)
3-Terra underflight (point 3)
4-Aqua underflight over aeronet site (point 7)